CLAIMS

1. A heat exchanger comprising a pair of header tanks arranged as spaced apart from each other, and a plurality of heat exchange tubes arranged in parallel between the pair of header tanks and each having opposite ends joined to the respective header tanks,

each of the header tanks comprising a header forming plate, a tube connecting plate and an intermediate plate interposed between the two plates, the header forming plate, the tube connecting plate and intermediate plate being arranged in superposed layers and brazed to one another, the header forming plate being provided with at least one outward bulging portion extending longitudinally thereof and having an opening closed with the intermediate plate, the tube connecting plate being provided at a portion thereof corresponding to the outward bulging portion with a plurality of tube insertion holes arranged longitudinally of the tube connecting plate at a spacing and extending through the thickness thereof, the intermediate plate having communication holes extending through the thickness thereof for causing the respective tube insertion holes of the tube connecting plate to communicate with interior of the outward bulging portion of the header forming plate therethrough, the heat exchange tubes having their opposite ends inserted into the respective tube insertion holes of the tube connecting plates of the header tanks and brazed to the tube connecting plates, at least one of all the outward bulging portions serving as a refrigerant passing outward bulging portion for causing a refrigerant to flow through the interior

thereof longitudinally thereof, the intermediate plate communication holes in communication with the refrigerant passing outward bulging portion being held in communication by communication portions formed in the intermediate plate, the communication portions and the communication holes thereby held in communication providing a refrigerant passageway for causing the refrigerant to flow therethrough longitudinally of the refrigerant passing outward bulging portion, the communication portions being adjusted in width to alter the cross sectional area of the refrigerant passageway along the lengthwise direction of the passageway.

2. A heat exchanger according to claim 1 wherein the header forming plate, the tube connecting plate and the intermediate plate are each made from a metal plate by press work.

3. A heat exchanger according to claim 1 wherein the cross sectional area of the refrigerant passageway formed in the intermediate plate decreases toward the downstream side with respect to the direction of flow of the refrigerant.

4. A heat exchanger according to claim 1 wherein the cross sectional area of the refrigerant passageway formed in the intermediate plate increases toward the downstream side with respect to the direction of flow of the refrigerant.

5. A heat exchanger according to claim 1 wherein the header forming plate of the first of the pair of header tanks has four outward bulging portions arranged widthwise thereof at a spacing and longitudinally thereof at a spacing, and the header forming plate of the second of the pair of header tanks has two outward bulging portions arranged side by side as spaced

apart widthwise thereof and opposed to the respective longitudinally adjacent pairs of outward bulging portions of the first header tank,

the tube connecting plate of each of the header tanks being provided with a plurality of tube insertion holes at each of widthwise opposite side portions thereof, the intermediate plate of each header tank being provided with a plurality of communication holes at each of widthwise opposite side portions thereof,

the two outward bulging portions of one of two pairs of widthwise arranged outward bulging portions of the first header tank each serving as the refrigerant passing outward bulging portion, the first header tank having a refrigerant inlet communicating with interior of one of the refrigerant passing outward bulging portions and a refrigerant outlet communicating with interior of the other refrigerant passing outward bulging portion, the communication holes of the intermediate plate of the first header tank in communication with one of the two outward bulging portions of the other of said two pairs and the communication holes of the intermediate plate in communication with the other outward bulging portion of said other pair being held in communication by refrigerant turn communication portions formed in the intermediate plate to thereby cause the two outward bulging portions of said other pair to communicate with each other,

the two outward bulging portions of the second header tank each serving as the refrigerant passing outward bulging portion.

6. A heat exchanger according to claim 5 wherein the

refrigerant inlet is provided at one end of the first header tank, and the refrigerant passageway formed in the intermediate plate so as to communicate with the refrigerant passing outward bulging portion in communication with the refrigerant inlet increases in cross sectional area as the passageway extends away from the refrigerant inlet.

7. A heat exchanger according to claim 5 wherein refrigerant passageways formed in the intermediate plate of the second header tank decrease in cross sectional area toward the downstream side with respect to the direction of flow of the refrigerant.

8. A supercritical refrigeration cycle which comprises a compressor, a gas cooler, an evaporator, a pressure reducing device and an intermediate heat exchanger for subjecting refrigerant flowing out from the gas cooler and refrigerant flowing out from the evaporator to heat exchange, and wherein a supercritical refrigerant is used, the gas cooler comprising a heat exchanger according to any one of claims 1 to 4.

9. A supercritical refrigeration cycle which comprises a compressor, a gas cooler, an evaporator, a pressure reducing device and an intermediate heat exchanger for subjecting refrigerant flowing out from the gas cooler and refrigerant flowing out from the evaporator to heat exchange, and wherein a supercritical refrigerant is used, the evaporator comprising a heat exchanger according to any one of claims 1 to 7.

10. A vehicle having installed therein a supercritical refrigeration cycle according to claim 8 as a vehicle air conditioner.

11. A vehicle having installed therein a supercritical refrigeration cycle according to claim 9 as a vehicle air conditioner.